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intervals of time), but from an analysis of integral equations of the

art. has: 27 formulas.

ACC NR: AT6035242

SOURCE CODE: UR/3043/66/000/005/0017/0020

AUTHOR: Tikhonov, A. N.; Gorbunov, A. D.; Gaysaryan, S. S.

ORG: none

TITLE: Description of an algorithm for optimum mesh construction in solving the Cauchy problem for ordinary differential equations by Runge Kutta methods

SOURCE: Moscow. Universitet. Vychislitel'nyy tsentr. Sbornik rabot, no. 5, 1966. Vychislitel'nyye metody i programmirovaniye (Computing methods and programming), 17-20

TOPIC TAGS: Cauchy problem, Runge Kutta ^{integration} method, ordinary differential equation, algorithm, differential equation solution

ABSTRACT: A method is proposed for selecting optimum inhomogeneous meshes when numerically solving a system of N ordinary differential equations:

$$y' = f(x, y), \quad y(x_0) = y_0 \quad (1)$$

(y and f are N-dimensional vectors) in the $x_0 \leq x \leq \bar{x}$ segment by a Runge-Kutta method of degree s. Mesh optimality denotes that at point \bar{x} the prescribed accuracy ϵ is obtained in the least possible number of steps. An inhomogeneous mesh (network) is given by means of constant λ , termed the parameter of the network, and the continuously differentiated function $\phi(x)$ of the distribution of the network steps so that at any node x_i ($-[x_0, \bar{x}]$) integration step h_i is determined by

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ACC NR: AT6035242

$$h_i = \lambda \varphi(x_i).$$

(2)

Optimality of the network is achieved by proper selection of network parameter λ and function $\varphi(x)$. The algorithm in question is for the solution of eq. (1) and embodies a preliminary computation which, although it does not give $y(x)$ with the necessary accuracy, still makes it possible to compute λ and $\varphi(x)$, which makes it possible to achieve the required accuracy at point \bar{x} on the second calculation. The paper gives a method for solving Eq. (1) when $N = 1$, and adduces two examples of Cauchy problems solved. Orig. art. has: 10 formulas.

SUB CODE: 12/ SUBM DATE: none/ ORIG REF: 001/ OTH REF: 001

Card 2/2

GORBUNOV, A. I.

"Rain-Water Erosion in the Western Central Ural Foothills and Agrotechnical Measures for Its Prevention." Cand Agr Sci, Tadzhik Agricultural Inst, Stalinabad, 1953. (RZhBiol, No 2, Sep 54)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (10)

So: Sum. No. 481, 5 May 55

GORBUNOV, A.I., glavnyy mekhanik distantii, g. Kalinin.

Electric power supply for track facilities. Put' i put.khoz. 4
no.10:25-27 0 '60. (MIRA 13:9)
(Railroads--Electric equipment)

GORBUNOV, A.I.

Spectrographic determination of nitrogen isotope composition. A. I. Gorbunov and P. A. Zagorets (U. i. Men-
shikov Chern. Technol. Inst. Moscow). Zhur. Fiz. Khim.
29, 1954, 6, 1555. -- Standard Russian spectrometers are
also used for the determination of N¹⁵ in biological and other

5(2)
 AUTHORS: Boreskov, G. K., Corresponding Member, SCV/20-123-1-23/56
 Academy of Sciences, USSR, Gorbunov, A. I., Mesanov, O. L.

TITLE: Isotopic Exchange in Molecular Nitrogen on Iron Catalysts
 Used in the Synthesis of Ammonia (Izotopnyy obmen
 v molekulyarnom azote na zheleznykh katalizatorakh sinteza
 ammiaka)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 1,
 pp 90 - 92 (USSR)

ABSTRACT: It was proved (Refs 1-3) that the addition of K_2O
 and Al_2O_3 to the iron catalysts increases their specific
 activity (related to unit surface) with regard
 to the synthesis of ammonia at high pressure. Once or
 twice activated samples have proved to be much more
 active than a non-activated iron catalyst. The acti-
 vating effect of K_2O was more marked than that of Al_2O_3 .
 The published views regarding the effect of these
 additions at atmospheric pressure are rather at
 variance (Refs 4,5). Therefore an additional, more

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Isotopic Exchange in Molecular Nitrogen on Iron
Catalysts Used in the Synthesis of Ammonia

SOV/20-123-1-23/56

comprehensive investigation of the problem under review with various contents of activator became necessary. The method of the experiment was already previously described in detail (Ref 5). Table 1 gives the values of the activation energy, of the order of reaction and of the specific catalytic activity $K(P, t)$ at corresponding pressure and temperature for the samples investigated. It can be concluded from this that the activated catalysts, as far as their specific activity is concerned, considerably surpass the Armko iron (without activator) (in accord with reference 5). There is quite a definite parallelism in the accelerating effect of the mentioned additions exerted on the processes of the ammonia synthesis and of the isotopic nitrogen exchange. This fact is difficult to understand if it is taken for proved (Refs 7-9) that the limiting stage in the ammonia synthesis is due to the hydrogenation of the adsorbed nitrogen. If it is assumed that the isotopic exchange and the synthesis of ammonia pass a common stage, nitrogen adsorption,

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Isotopic Exchange in Molecular Nitrogen on Iron
Catalysts Used in the Synthesis of Ammonia

SOV/20-123-1-23/56

the rates of both reactions may be quantitatively compared with each other. Here, the filling of the surface of the catalyst by the adsorbed nitrogen must be considered (Ref 5). The calculation shows that the absolute rates of reaction of the ammonia synthesis and of the isotopic exchange proved to be similar in samples once activated and in Armko-iron, at equal covering by adsorbed nitrogen (the data of N.M.Morozov from the laboratory of Professor M.J.Temkin were utilized). Thus, the evidence presented in this paper confirmed the mechanism of Temkin-Pyzhev (Ref 10) regarding the isotopic exchange on iron-ammonia catalysts. There are 1 table and 10 references, 7 of which are Soviet.

ASSOCIATION: Fiziko-khimicheskiy institut im.L.Ya.Karpova (Physico-Chemical Institute imeni L.Ya.Karpov) Moskovskiy khimiko-tekhnologicheskii institut im. D.I.Mendeleyeva (Moscow Institute of Chemical Technology imeni D.I. Mendeleyev)

Card 3/4

GORBUNOV, A. I., Cand Chem Sci -- (diss) "Catalysis of isotopic exchange in molecular nitrogen by transitional metals of period IV." Moscow, 1960. 11 pp; (Moscow State Univ im M. V. Lomonosov, Faculty of Chemistry); 170 copies; price not given; (KL, 32-60, 146)

GORBUNOV, A.I.; BORESKOV, G.K.

Catalysis of isotopic exchange in molecular nitrogen induced by transition metals of the fourth period. Probl. kin. i kat. 10:192-198 '60. (MIRA 14:5)

1. Moskovskiy khimiko-tekhnologicheskii institut imeni D.I. Mendeleeva.

(Nitrogen—Isotopes) (Catalysts)
(Transition metals)

BORESKOV, G.K.; GORBUNOV, A.I.

Second International Congress on Catalysis in Paris. Kin. i
kat. 1 no. 4:622-627 N-D '60. (MIRA 13:12)
(Catalysis--Congresses)

GORBUNOV, A.I.

Isotopic exchange in molecular nitrogen on metallic chromium.
Izv.vys.ucheb.zav.; khim.i khim tekh. 3 no.1:20-23 '60.

(MIRA 13:6)

1. Kafedra tekhnologii razdeleniya izotopov Moskovskogo khimiko-
tekhnologicheskogo instituta imeni D.I.Mendeleeva.
(Nitrogen--Isotopes) (Chromium) (Catalysis)

BORESKOV, G.K.; GORBUNOV, A.I., kand.khim.nauk

Second International Congress on Catalysis». Vest.AN SSSR 30 no.12:
49-54 D '60. (MIRA 13:12)

(Catalysis)

BORESKOV, G.K.; GORBUNOV, A.I.

Effect of chromium additions to a nickel skeleton catalyst
on the rate of isotope exchange in molecular nitrogen. Zhur.
fiz.khim. 35 no.9:2071-2077 '61.
(MIRA 14:10)

1. Fiziko-khimicheskiy institut imeni L.Ya. Karpova i Moskovskiy
khimiko-tekhnologicheskoy institut imeni D.I. Mendeleevaya.
(Nitrogen--Isotopes) (Nickel)

BORESKOV, G.K.; GORBUNOV, A.I.

Preparation of metallic catalysts as vacuum condensed films on
a finely disperse carrier. Zhur. fiz. khim. 37 no.12:2728-
2733 D '63.
(MIRA 17:1)

1. Fiziko-khimicheskiy institut imeni L.Ya. Karpova.

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... nature of surface bonded compounds of these ... similarity in the ...

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CIA-RDP86-00513R000516110013-3"

L 10438-66 EWT(m)/EWF(b)

JW/RM

ACC. NR. AP6000281

SOURCE CODE: UR/0078/65/010/009/1971/1975 77

AUTHOR: Gorbunov, A. I.; Solov'yeva, G. S.; Antonov, I. S.; Kharson, M. S. 71 B

ORG: none

TITLE: Solubility of diborane¹ in diethylene glycol dimethyl ether¹

SOURCE: Zhurnal neorganicheskoy khimii, v. 10, no. 9, 1965, 1971-1975

TOPIC TAGS: ether, solubility, heat of vaporization, diborane, diethylene glycol, pressure, temperature dependence, high temperature effect, low temperature effect
 ABSTRACT: The solubility of diborane in diethylene glycol dimethyl ether (DGDE) was determined at temperatures of -50, -20, 0, +20, +40, and +60C and partial pressures of diborane from 114 to 695mm Hg, and also at -20, 0, and +20C at pressures from 1 to 10 atm. The solutions were found to obey Henry's law under these conditions. An empirical equation is given for the temperature dependence of the Henry coefficients: for pressures up to 1 atm., $\log K = 6.86 - \frac{749.4}{T}$; for pressures up to 10 atm, $\log K = 6.66 - \frac{646.2}{T}$. The calculated heat of^T vaporization of diborane from its solutions^T in DGDE is 3 - 3.4 kcal/mole. It was found that the reaction of diborane with DGDE is autocatalytic and forms methane, the reaction rate being accelerated with rising pressure and temperature.

Card 1/2

UDC: 546.271

L 10438-66
ACC. NR. AP6000281

744,55 6
The vapor pressure of DGDE was determined in the range of 40.- 90C. M. K. 44,55
Kapralova kindly supplied the DGDE samples. Orig. art. has: 4 figures, 3 tables,
and 3 formulas.

SUB CODE: 07,20/ SUBM DATE: 14Mar64

jc

Card 2/2

AUTHOR: JORDANEY, J. J.

... seats of civilization and the commerce of the world.

See also: *Am. Econ. Assoc. Q.*, v. 101, no. 3, 1965, 1121-1123.

[illegible]

$$M = M_1 \oplus M_2 \oplus \dots \oplus M_n \quad \text{with} \quad M_{i+1} \cong M_i \oplus A, \quad M_{n+1} = 0.$$

where A is the absolute decline, k is the surface area of the

Journal of Management Studies, 19(1), 67-80.

(VII) $\vdash \neg A$

Wang et al. (2010) and Wang and Wu (2011) have shown that the β -phase of PbTiO_3 is a ferroelectric material with a large piezoelectric coefficient. The β -phase of PbTiO_3 is a ferroelectric material with a large piezoelectric coefficient. The β -phase of PbTiO_3 is a ferroelectric material with a large piezoelectric coefficient.

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L 5300124

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3

ACC NR: AP7000992

(A, N)

SOURCE CODE: UR/0439/65/044/009/1416/1419

AUTHOR: Maslennikova, Z. P.; Gorbunov, A. I. (Deceased)

ORG: Central Asian Antiplague Institute, Alma-Ata (Sredneaziatskiy nauchno-issledovatel'skiy protivochumnyy institut)

TITLE: The biology of fleas of great gerbils in the northern desert subzone after rodent extermination aimed at the suppression of plague epizootics

SOURCE: Zoologicheskii zhurnal, v. 44, no. 9, 1965, 1416-1419

TOPIC TAGS: parasitology, animal parasite, disease vector, epizootology, DISEASE CONTROL, RODENT

ABSTRACT: The longevity of *Xenopsylla* fleas after a highly successful extermination of their gerbil hosts (species *Rhombomys opimus*) in 1959—1961 was studied in the Sary-Ishik-Otrau sands. *Xenopsylla skrjabini* and *Xenopsylla hirtipes* fleas represented 96—97% of the original population of fleas in rodent burrows. It was found that fleas which had not fed since autumn and fleas hatched before or after gerbil extermination, died by the following spring. Of the fleas surviving, most still had traces of blood in their stomachs. After extermination, the number of fleas per gerbil colony dropped (fall to spring) from 1565 to 61 in sands and from 4244 to 297 in soils overgrown with saxaul plant. Two years after extermination, the flea population was reduced more than 100 times, although 20—40% of colonies were still inhabited. Orig. art. has: 1 table. [WA-50]

SUB CODE: 06/ SUBM DATE: none/ ORIG REF: 007/

Card 1/1

UDC: 595.775:599.323.4 Rhombomys: 591.5

I. 41331-66 EWT(d)/EWF(:)/EWP(v)/T/EWP(k)/EWP(1) IJP(c) RM

ACC NR: AP6019927

(A)

SOURCE CODE: UR/0122/66/000/006/0028/0030

AUTHOR: Gorbunov, A. I. (Engineer); Freydin, A. S. (Candidate of technical sciences);
Ragol'skaya, V. I. (Engineer)

60
B

ORG: None

TITLE: Nondestructive quality control of hermetically sealed joints

SOURCE: Vestnik mashinostroyeniya, ¹⁴no. 6, 1966, 28-30

TOPIC TAGS: flaw detection, ultrasonic flaw detector, acoustic echo, hermetic seal, piezoelectric crystal, ultrasonic absorption

ABSTRACT: The authors describe two ultrasonic methods for inspection of hermetic sealing: the shadow method and the echo method. The shadow method is based on the fact that flaws filled with air or some other gas are nearly opaque to ultrasonic waves so that shadows are formed behind them. Calculations show that interlayers of air begin to show transparency to ultrasonic energy at a frequency of 5 Mc only when they are less than 10^{-5} mm thick, and show 80% transmission when the thickness reaches 10^{-8} mm. The shadow method gives reliable results since flaw clearances are normally large. The dimensions of the shadow are equal to those of the flaw at a distance of less than

$$l = \frac{D^2}{4\lambda}$$

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UDC: 620.165.29:620.179.16

L 41331-66

ACC NR: AP6019927

0

where D is the diameter of the flaw and λ is the ultrasonic wavelength. There is a reduction in the size of the shadow due to diffraction at large distances, and the dimensions can be found from the formula

$$D_r = D - 2(L - l) \tan \alpha,$$

where L is the distance from the flaw to the reception point, and $\alpha = 1.22\lambda/D$ is the angle of divergence of the ultrasonic waves. The degree of damping and dispersion are considered. The pulse-type UDM-1m ultrasonic flaw detector was used for checking the hermetic sealing of joints by the echo method. If the joint is airtight, part of the pulse energy is transmitted to the piezoelectric plate and part is reflected. The flaw detector screen shows a single incoming signal if the ultrasonic beam is damped to any extent in the joint. If damping is not significant, the signal is reflected several times from the surfaces of the joint and a damped wave is observed on the screen. Destructive tests confirmed the nondestructive data as to size, shape and location of flaws. The echo method does not require access to both sides of the joint and is presently widely used in industry. Much thinner gas and air interlayers can be detected by this method and its sensitivity is also greater than that of the shadow method. Flaws can be detected down to 40 mm^2 under ordinary conditions, while special conditions permit detection of flaws as small as 3 mm^2 . Orig. art. has: 3 figures, 3 formulas.

SUB CODE: 13, ~~24~~/ SUBM DATE: none

Card 2/2 11b

ACC NR: AP7006226 (A,N) SOURCE CODE: UR/0078/67/012/001/0003/0007

AUTHOR: Gorbunov, A. I.; Solov'yeva, G. S.

ORG: none

TITLE: Preparation of diborane by hydrogenation of alkyldichloroboranes

SOURCE: Zhurnal neorganicheskoy khimii, v. 12, no. 1, 1967, 3-7

TOPIC TAGS: diborane, chemical synthesis, boron compound, HYDROGENATION

ABSTRACT: Diborane has been prepared by a new method involving hydrogenation of alkyldichloroboranes at atmospheric or high pressures. Identification of the reaction products by IR spectroscopy indicated that the hydrogenation probably proceeds via the B-C bond without affecting the B-Cl bond to form dichloroborane: $\text{RBCl}_2 + \text{H}_2 \rightarrow \text{HBCl}_2 + \text{RH}$. Diborane is probably formed as a result of the disproportionation of HBCl_2 . The results of experiments conducted at atmospheric pressure and 250–540C in a flow apparatus given in Table 1 indicated that the alkyldichloroboranes are hydrogenated only in the presence of SKLT-D or AR-3 carbons. Lower degrees of conversion based on HBCl_2 , as compared with those based on RH, indicated that the diborane formed undergoes pyrolysis on the catalyst. Experiments at 300–340C and hydrogen pressures of 100–200 atm (Table 2) yielded diborane in the absence

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UDC: 546.271.05

ACC NR: AP7006226

Table 1. Hydrogenation of alkylchloroboranes at atmospheric pressure

Catalyst	$\text{RBCl}_2:\text{H}_2$ ratio	t, °C	Conversion based on HBCl_2 , %	Conversion based on RH, %	Contact time, sec
Ethylchloroborane					
Without catalyst	1:4	475	—	slight	60
10 ml SKLT-D carbon	1:5.26	370	—	—	—
10 ml SKLT-D carbon	1:5.8	475	3.72	56	3.7
10 ml 0.44% Pt on graphite	1:5.3	450	—	—	3.8
10 ml 0.44% Pt on graphite	1:5.3	500	—	slight	—
10 ml 0.44% Pt on graphite	1:5.3	540	0.98	18.3	3.5
10 ml 0.2% Pt on SKLT-D	1:7	411	4.69	76.2	3.4
3 ml 0.2% Pt on SKLT-D	1:7.5	475	3.93	34	2.2
10 ml AR-3 carbon	1:6.1	400	2.5	36	3.6
Propylchloroborane					
10 ml Ni on Cr_2O_3	1:6	250	—	—	3.5
10 ml 0.6% Pt on SKLT-D	1:6	300	—	slight	—
10 ml 0.6% Pt on SKLT-D	1:6	410	—	40	—

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ACC. NR. AP7006226

Table 2. Hydrogenation of alkylchloroboranes at high pressures

1	2	3	4	5	6	7	8	9
Ethylchloroborane								
1.08	304	103	1:0.4	2181	63	28.2	—	7.5
1.1	305-320	150	1:11.4	2021	63	28.8	1.3	7
7.6	308-305	182	1:1.5	205	23.8	45.2	1.1	23
3.6	250	190	1:4.4	1730	3.71	—	—	1
3.1	283	—	1:4.97	1830	13.93	—	—	3
3.5	320	170	1:4.5	636	32.6	41.5	1.8	14
3.5	—	164	1:4.3	636	67	36.3	—	22
3.2	—	153	1:3.6	593	83.7	37	1.07	20
3.5	—	167	1:3.3	391	47.1	52.2	—	13.5
3.7	—	165	1:2	303	52.3	47.6	—	17
8.4	—	153	1:0.5	267	39	31.6	—	—
3.3	340	172	1:4.4	227	42.9	—	—	—
4.6	—	213	1:3.8	168	57.7	—	—	9.5
3.8	340	200	1:4.5	376	95	21	—	—
3.6	340	200	1:4.6	730	95.6	26.8	—	19.5
4.2	—	202	1:3.95	551	78.5	38.9	—	—
5.2	340	195	1:2.1	482	33	48.6	—	—
7.2	340	170	1:0.86	332	37.2	41.1	—	—
Propylchloroborane								
3.1	300	110	1:3.4	—	19.08	24.4	8	3
2.1	—	130	1:3	—	25.0	24.7	—	4

1 - Ethylchloroborane charge, g;
 2 - Temperature of the autoclave, °C;
 3 - Pressure, atm;
 4 - $\text{RBCl}_2:\text{H}_2$ ratios;
 5 - Contact time, sec; 6 - Conversion based on C_2H_6 or C_3H_8 , %; 7 - Yield in diborane, %;
 8 - Diborane content in the mixture, % by weight; 9 - Paraffin content, % by volume.

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ACC NR: AP7006226

of catalysts. Study of the pyrolysis of neat diborane and of its mixtures with hydrogen and boron chloride indicated that pyrolysis of diborane sharply decreases in the presence of BCl_3 , probably because of the formation of the stable $\text{B}_2\text{H}_5\text{Cl}$ and BHCl_2 compounds. Orig. art. has: 3 tables.

[W. A. 77]

[BO]

SUB CODE: 21, 07/ SUBM DATE: 20Feb65/ ORIG REF: 007/ OTH REF: 008

Cord 4/4

1ST AND 2ND ORDERS										PROCESSES AND PROPERTIES INDEX										3RD AND 4TH ORDERS									
<p>cc</p>										<p>Step-hardening of diaphragms with simultaneous adjusting in the austenite condition. A. M. Gorlunov. <i>Kachestvennaya Stal</i> 5, No. 2, 52-3(1937); <i>Chem. Zentr.</i> 1937, II, 666-7.—The following is recommended as the most satisfactory treatment for step-hardening a steel contg. 0.84% C and 0.20% Mn for the manuf. of diaphragms for automobile horns: heating to 720° and holding at that temp. for 4 hrs., further heating to 780° (3 hrs.), cooling to 600°, heating again to 680-700° (3 hrs.) and cooling in the furnace to 300°. M. G. M.</p>										<p>9</p>									
<p>45B.51.4 METALLURGICAL LITERATURE CLASSIFICATION</p>										<p>45B.51.4 METALLURGICAL LITERATURE CLASSIFICATION</p>										<p>45B.51.4 METALLURGICAL LITERATURE CLASSIFICATION</p>									

GORBUNOV, A.

Low-Tungsten High-Speed Steel Substitutes. A. Gorbunov and Ya. Doygalevskiy. (Stal, 1938, No. 5, pp. 55-60). (In Russian). The object of the investigation was a further study of the effects of different heat treatments on the mechanical properties of chromium-tungsten-vanadium steels suggested by N. A. Minkevich, V. S. Vladislavlev and O. S. Ivanov (see Kachestvennaya Stal, 1937, No. 5-6, pp. 7-18), as well as to test under service conditions some cutting tools made from these steels. The first two heats of steel (E7173) contained chromium 0.20% and 10-10%, tungsten 2.58% and 3.05%, vanadium 0.81% and 0.35%, silicon 0.25% and 0.21%, and carbon 1.10% and 1.16%, respectively, whilst the other steel (E7184) contained chromium 8.68%, tungsten 4.08%, vanadium 1.50%, silicon 0.62% and carbon 0.086%. An analysis of the crystalline structure of the steel was made by X-rays to establish the phases present (Cr_7C_3 , Fe_3W_2C and Fe_2C were detected). The effects of heat treatment (different quenching temperatures, stepped quenching and single and multi-stage annealing) were studied both by magnetic and by electrical measurements, as well as by Rockwell hardness and other mechanical tests. The optimum heat-treatment schedules were determined. Practical tests on various types of cutting tools made from these steels showed that their resistance to wear was equal to, and in some cases better than, that of the 18 4.1 high-speed tool steel used at present. In the case of lathe cutting tools it was shown that their life could be considerably prolonged by heating for 10-15 min. in a cyanide bath at 550° C.

(GORBUNOV, A.

S

The Stepped Quenching of Low-Tungsten Substitutes for High-Speed Steel. A. Gorbunov and Ya. Dovgalevskiy. (Stal, 1939, No. 8, pp. 47-49). (In Russian). The steels investigated were K1173 (carbon 1.1%, chromium 0.2%, tungsten 2.37%, vanadium 0.81%) and K1184 (carbon 0.80%, silicon 0.63%, chromium 2.41%, tungsten 4.38%, vanadium 1.32%). Most of the experiments were made on the former steel. The fully annealed specimens of this steel were heated at 1200° C. for 5 min., then transferred to a lead bath at a temperature of 550-700° C., held for various periods of from 10 to 180 min. and then cooled in still air. Tests on heat-treated specimens included Rockwell hardness measurements and measurements of the magnetic saturation and the coercive force. Subsequently the effect of repeated tempering (1 hr. periods in a lead bath at 550° C.) on the step-quenched specimens was examined. A study was also made of "tempering" step-quenched specimens at 182° C., followed by aging at 100° C. It was found that by suitable stepped quenching with subsequent triple tempering it was possible to decompose the residual austenite in these steels almost completely and thereby raise the hardness to Rockwell C 64-65. On aging at 100° C. the austenite decomposed less completely (although more so than after ordinary quenching and triple tempering). A maximum hardness of about Rockwell C 60 was obtained by quenching from 1200° C. in a bath at 550-600° C., holding for 10-40 min., then tempering in liquid nitrogen and finally aging at 100° C. for 1 hr.

ASB-564 METALLURGICAL LITERATURE CLASSIFICATION

Magnetic determination of the depth of the hardened layer in steel. M. V. Dekhtyar, A. M. Gorbunov, L. M. Baldina, and G. M. Kasatkina. *Zashchita Laz.* 12, 806-16(1948).—In a two-layer cylinder consisting of a sorbite core (subscript s) and a martensite envelope (subscript m), the curves of the magnetic flux Φ against the demagnetizing field strength H have different slopes for the two layers. At $H = H_m$ (coercive field), $\Phi_s = 0$ while Φ_m is still pos.; at $H = H_m$, $\Phi_m = 0$ while Φ_s is neg.; at an intermediate H , $\Phi_s = \Phi_m$ and of opposing signs, resulting in compensation. On the basis of the linearity between H and Φ , on magnetization in a weak field and demagnetization along recurrent cycles, if $\Delta H =$ excess of H of the 2-layer cylinder over H_m , a resultant $\Phi = 0$ corresponds to $\Delta H = (H_m - H_0)/(1/I_m)(S_m/S_s)$ ($S_m/S_s + 1$) where $I =$ residual magnetic moment, S_m/S_s the ratio of the cross-section areas of s and m; for practical measurements, the proportional demagnetizing current intensities i and Δi , are substituted for the H and ΔH ; the magnitudes i_m , i_s , and $1/I_m$ being const. and known, S_m/S_s can be detd. from $i_s + \Delta i$. The corrector includes a magnetizing and a compensating coil, disposed on both sides of a magnetic needle, at rest in the absence of a sample; the latter is then placed in the first coil, and i , corresponding to restoration of the original position of the needle, read on a millimeter; for measurements along the recurrent branches, the sample is demagnetized in $H = H_m$, the latter switched off, and the sample demagnetized anew. In measurements along normal cycles, expll. points (depth of hardened layer d observed directly on the cross section) were found to be evenly spread around the theoretical $\Delta i/(S_m/S_s)$ curve. i_m and i_s were 630 and 1000 milliamperes, resp., with $1/I_m = 1.05$; d (from S_m/S_s) 2.0-8.0 mm. Temp. ring lowers Δi , smoothing out the differences between samples differing in d . In measurements along recurrent cycles, the sensitivity of the method is considerably higher, e.g., sample, $S_m/S_s = 1.11, 0.71, 0.28$, in normal and in recurrent cycle $i = 300, 350, 500$ and $150, 250, 500$ milliamps, increase in Δi relative to first sample 0, 28, 50 and 0, 50, 200%. The expll. points coincide very satisfactorily with the theoretical curve constructed with $1/I_m = 0.15$, $H_m = 5$, $H_0 = 20$ oersteds. The superiority of the magnetic method over visual observation is illustrated by cases where the latter inspection showed a normal d (2.1-2.6 mm.), but the correctorometric Δi were abnormally low (161-192 milliamperes as against expected 300-425); micrographic examn. confirmed that in these cases the envelope contained ferrite. In defective samples, the boundary between core and martensite appears blurred, it is sharp in normal samples.

W. R. Henn

GORBUNOV, A.M.

91-58-7-10/27

AUTHORS: Verner, M.A., and Gorbunov, A.M., Engineers

TITLE: Exchange of Experience (Obmen opytom). The Elimination of Spring Breaks of the Centrifugal Regulator of the "AP-25-1 LMZ" Type Turbine (Ustraneniye polomok pruzhin tsentrobezhnogo regulatora turbiny AP-25-1 LMZ).

PERIODICAL: Energetik, 1958, Nr 7, pp 23-25 (USSR).

ABSTRACT: The article describes the causes of spring breakage of the above regulator and gives the results of laboratory research. The top of the fatigue destruction zone seemed to be the origin of cracks. Pulsations of 2 to 3 mm amplitude were stated in the levers of the regulator, from where they were transmitted to the springs. Some measures taken to eliminate these pulsations, lowering them to 1 mm. Later it was stated, that the vibrations of the regulator were influenced by the operation of the worm gear between the turbine axle and the regulator shaft. The side-gap in the worm gear was about 1.3 mm. It did not influence the operation of the worm gear, but it caused periodical pulsations in the regulator shaft and in the levers and springs. After having carefully adjusted the new worm gear and centered the shaft of the regulator with that of the oil pump, the pulsations completely disappeared and spring breakage was stop-

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91-58-7-10/27

Exchange of Experience. The Elimination of Spring Breaks of the Centrifugal Regulator of the "AP-25-1 LMZ" Type Turbine.

ped. This resulted from research. The permissible value of the side-gap in the worm gear must not exceed 0.5 to 0.6 mm. The recommendations of the "LMZ" for replacing the 4-mesh worm gear by a 3-mesh one to increase its strength are not justified. According to the experience of the author, a 4-mesh worm gear is sufficiently reliable if carefully adjusted. There is 1 diagram and 1 photo.

1. Springs--Failure
2. Turbine regulators--Maintenance

Card 2/2

SOV/136- 59-5-12/21

AUTHORS: Leytsin, V.A., and Gorbunov, A.M.

TITLE: Influence of Charge Composition on Lead Recovery in Smelting Waste Zinc Cake (Vliyaniye sostava shikhty na izvlecheniye svintsa pri vel'tsevani otval'nykh tsinkovykh kekov)

PERIODICAL: Tsvetnyye metally, 1959, Nr 5, pp 59-62 (USSR)

ABSTRACT: All Soviet zinc electrolytic works smelt waste zinc cake to recover zinc, lead, cadmium and other elements. Lead recovery varies from 75 to 95% and the present work aimed at studying the effect of charge composition on the behaviour of lead during smelting. This process involves reduction of metal compounds, distillation of volatile metals and compounds and oxidation of metal vapours in the gas off-take. At the Chelyabinskiy elektrolitnyy tsinkovyy zavod (Chelyabinsk Electrolytic Zinc Works) a mixture of cakes is used containing 18-24% total Zn, 0.15-0.22% Cd, 2.5-4.0% Pb, 20-25% Fe, 7-9% total S, 9-13% SiO₂, 0.8-1.2% MgO, 1.8-2.7% CaO, 11-15% H₂O (table 3 gives compositions of components). In the dried mixture lead occurs in the sulphate, oxide, sulphide, silicate and other forms (Table 4), of which

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SOV/136-59-5-12/21

Influence of Charge Composition on Lead Recovery in Smelting Waste Zinc Cake

sulphide is the most favourable for recovery. An analysis of 1955-1958 operating data for the works was carried out. Fig 1 shows plots against time of lead contents in the cake and clinker, of calculated lead recovery in the clinker and copper-content in the cake. The data indicate that lead losses in clinker rise with rising lead content in the cake; the losses increase with increasing cake copper-content (over 2-3%). Fig 2 shows frequency curves for clinker- and cake-lead contents for less than 3% Cu (curve 1) and over 3% Cu (curve 2). Tests confirmed the effectiveness of reducing cake copper contents for improving lead recovery (Table 6).

Card 2/2 There are 2 figures, 6 tables and 4 Soviet references.

ASSOCIATION: Chelyabinskiy Tsinkovyy Zavod (Chelyabinsk Zinc Works)

GORBUNOV, Arnol'd Matveyevich

Knigi zarubezhnykh pisateley XX (i.e. dvadtsatyy) veka; rekomendatel'nyy ukazatel' 9by) A.M. Gorbunov, M.I. Davydova (i) Z.P. Shalashova. Moskva, 1960.

243 p.

At head of title: Russia (RSFSR) Ministerstvo Kul'tury and Moscow. Publichnaya Biblioteka.

ARBUZOV, B.A.; CORBUNOV, A.M.

Casting aluminum alloys in permanent molds using shell-molded
cores. Alium. splayv no.1:160-176 '63. (MIRA 16:11)

OVCHINNIKOV, Yu.F.; SOYFER, D.V.; CHIKHACHEV, O.P.; Prinimali uchastiye:
ARBUZOV, B.A.; GORBUNOV, A.M.; KLEYNER, L.M.

Making aluminum alloy parts with intricate internal channels.
Alum. splavy no.1:195-201 '63. (MIRA 16:11)

GORBUNOV, A.M.

Effect of technological factors on the quality of aluminum
castings. Alium. splavy no.1:230-233 '63. (MIRA 16:11)

CA

3A

Nuclear fissions and heavy particles in cosmic rays. A. N. Gorbunov. *Zhur. Eksp. Teor. Fiz.* 18, 273 (1958); *ibid.* 41, 1540. — Nuclear fissions were observed at 3800 and 4700 m. above sea level with the aid of special double proportional counters in Pb cells. Fissions are generated more copiously in Pb than in Al; they are produced under 10 cm. Pb, and the no. fissions/hr. increases with height more rapidly than the current of hard components of cosmic radiation. It is indicated that the generating particles are neutral and unstable. F. H. M.

GORBUNOV, A. N.

PA 35/49T77

USSR/Nuclear Physics - Cosmic Radiation Aug 48
Nuclear Physics - Counters, Electronic

"Investigation of Heavy Particles in Cosmic Rays
by Means of a Proportional Counter," A. N.
Gorbunov, I. V. Chuvpilo, Phys Inst Imeni P. N. U.
Lebedev, Acad Sci USSR, 4 pp

"Dok Ak Nauk SSSR" Vol LXI, No 6

613.711
613.73

Describes special counter, with diagram. Gives re-
sults obtained with use of this counter at heights
of 3,860 and 4,700 meters. (two measurements) in
table showing number of double concurrences per
hour. Graphs show absorption of particles generat-
ing nuclear fissions, dependence of the effective

35/49T77

USSR/Nuclear Physics Cosmic Radia-
tion (Contd)

Aug 48

cross section of the absorption of generating
particles upon atomic weight, and number of double
and fivefold coincidences per hour. Submitted by
Acad S. I. Vavilov, 21 Jun 48.

35/49T77

USSR/Nuclear Physics - Cosmic Rays
Fission
Dec 49

"Nuclear Fission and Electron-Nuclear Showers in Cosmic Rays," A. N. Gorbunov, Phys Inst Imeni Lebedev, Acad Sci USSR, 20 pp

"Zhur Eksper i Teoret Fiz" Vol XIX, No 12

Gorbunov describes experiments he carried out during Pamir Expeditions, 1946 - 1949, of Phys Inst Imeni Lebedev. He investigated properties of particles entering the composition of products of nuclear fission in cosmic rays and the relation of generating particles to the narrow and electron-nuclear showers.

152179

USSR/Nuclear Physics - Cosmic Rays
(Contd)
Dec 49

Also, he measured coefficients of absorption for penetrating generative particles in several dense filters and in the air. Submitted 17 Aug 49.

152179

GORBUNOV, A. N.

GORBUNOV, A.

USSR/Nuclear Physics - Cosmic Radiation
Nuclear Physics - Elementary Particles

Apr 49

"'Special' Cosmic-Ray Showers," S. Azimov, N. Birger, A. Gorbunov, Phys Inst Imeni P. N. Lebedev, Acad Sci USSR, 4 pp

"Dok Ak Nauk SSSR" Vol LXV, No 5

"Special" showers were discovered during 1945 Pamir expedition. Basic peculiarity of these showers, generated in lead, is simultaneous appearance of heavy, strongly ionizing and penetrating particles, and also electrons. Discusses strongly ionizing and penetrating particles and connection of "special" showers with atmospheric showers. Gives several examples of "special" showers.

Submitted by Acad D. V. Skobel'tsyn, 15 Feb 49

PA 39/49T97

GORBUNOV, A. N.

USSR/Nuclear Physics - Cosmic Rays 21 Nov 49
Particles, Elementary

"Investigation Into the Relation Between Heavy Particles and 'Special' Showers in Cosmic Rays," A. N. Gorbunov, I. V. Chuvilo, Phys Inst imeni Lebedev, Acad Sci USSR, 3 pp

"Dok Ak Nauk SSSR" Vol LXIX, No 3

Experiments (Pamir Expedition, 1948) indicate presence, under lead, of dense "special" showers with more than 25 particles per 100 sq cm. Concluded that many nucleo-interacting particles enter composition of "special" showers. Submitted 22 Jul 49 by Acad D. V. Skobel'tsyn.

158T77

GORBUNOV, A.N., SPIRIDONOV, V.M.,

"Photodisintegration of Helium,"

Lebedev Physics. Inst. Acad. Sci. USSR

paper submitted at the A-U Conf. on Nuclear Reactions in Medium and Low Energy
Physics, Moscow, 19-27 Nov 57.

Gorbunov, A. N.
AUTHOR: Gorbunov, A. N., Spiridonov, V. M., and Cherenkov, P. A. 120-2-8/37
TITLE: An Application of the Wilson Cloud Chamber to Photonuclear Studies. (Primeneniye Kamery Vil'sona dlya Issledovaniya Fotoyadernykh Protsessov.)
PERIODICAL: Priory i Tekhnika Eksperimenta, 1957, No.2, pp. 29 - 32 (USSR).

ABSTRACT: The use of the Wilson cloud chamber in investigations of the interaction between high energy gamma quanta, though cumbersome, has the advantage that it makes possible an analysis of practically all the nuclear processes initiated by the radiation in the gas. In the present article the authors describe a few interesting problems occurring where the Wilson chamber is used in the investigation of photonuclear processes induced by high energy gamma-radiation (maximum energy 260 MeV) from the synchrotron of the Institute of Physics of the Academy of Sciences of the USSR. The synchrotron generates impulses of gamma rays at the repetition frequency of 50 secs.⁻¹ In order to obtain the best possible working conditions for the chamber a special working regime had to be established for the synchrotron and the working of the chamber synchronised with the emission of the radiation pulse. The procedure

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An Application of the Wilson Cloud Chamber to Photonuclear Studies. 120-2-8/37

adopted was that given in reference 3. The procedure involves an application of the chamber to gamma ray studies with practically no loss in the efficiency of the accelerator. The intensity of the radiated beam of the above synchrotron is 2×10^{10} MeV/cm² at 260 MeV, and at 10m from the target. The energy flux per pulse is approximately

7×10^7 MeV/cm². Special measures based on the results of reference 3 which are necessary to eliminate the electron and positron background had to be applied. These measures were :- 1) the beam was injected into the chamber through a side window covered by an organic film 70μ thick; 2) the beam was collimated by a lead collimator 15cm long placed at 3.5m from the chamber; 3) a magnet placed behind the collimator removed positrons and electrons from the γ-ray beam; 4) an evacuated tube was placed between the collimator and the chamber so as to eliminate electrons and positrons formed in air. As a result of the above precautions the number of unwanted electrons and positrons associated with the gamma beam was reduced by a factor of 1000.

The following working procedure was adopted. The main expansion was followed by a fast (0.5 sec) compression Card 2/3 and then by a slow expansion followed once more by a fast

An Application of the Wilson Cloud Chamber to Photonuclear Studies. 120-2-8/37

compression. As a result of these procedures the chamber was effectively cleared of droplets after each expansion, the electron background was reduced and γ -ray beams of up to 10^8 MeV per pulse could be employed with the camera set for the detection of relativistic particles. In the case of strongly ionising particles the working γ -ray intensity can be increased still further (by a factor of 5 - 10) if one works with a lower chamber sensitivity. A graph of the synchrotron output as a function of time (under working conditions), and 3 cloud chamber photographs are given. There are 6 references, 5 of which are Slavic.

SUBMITTED: December, 10, 1956.

ASSOCIATION: Institute of Physics imeni P. N. Lebedev of the Academy of Sciences of the USSR. (Fizicheskiy Institut im. P. N. Lebedeva AN SSSR.)

AVAILABLE: Library of Congress.

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GORBUNOV, A.N.

120-3-2/40

AUTHORS: Gerasimov, A.G., Gorbunov, A.N., Ivanov, Yu.S.,
Kutsenko, A.V., Spiridonov, V.M.

TITLE: A Wilson Chamber for Work in the Beam of Cyclotron Radiation and the Auxiliary Apparatus (Kamera Vil'sona dlya raboty v puchke izlucheniya sinkhrotrona i vspomogatel'naya apparatura)

PERIODICAL: Priroda i Tekhnika Eksperimenta, 1957, Nr 3, pp.10-14 (USSR)

ABSTRACT: A Wilson cloud chamber which operates in a magnetic field is described. It can be used to study photonuclear reactions. The working regime has already been given in a previous paper (Ref.1). In the present paper a description is given of the various parts of the chamber and of the auxiliary apparatus, i.e., the control apparatus, the apparatus synchronizing the work of the chamber with that of the synchrotron, and the apparatus used to measure the intensity of the emitted pulses which are recorded by the Wilson chamber. An important part of the chamber is an organic film 70 μ thick which serves as the window through which the γ -rays enter the sensitive volume. The film is 30 mm in diameter and can withstand a pressure of the order of 3-4 atmospheres. The method of mounting of the film is shown

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120-3-2/40

A Wilson Chamber for Work in the Beam of Cyclotron Radiation and the Auxiliary Apparatus.

in Fig.1. An electrostatic field of ~ 40 V/cm is established between the glass lid and the bottom of the chamber. This field removes ions formed within the volume of the chamber during irradiation. The pressure in the lower volume of the chamber is stabilised to ~ 0.01 atm. using a mechanical pressure stabilizer shown in Fig.2 and developed by D. V. Emel'yanov. A detailed description is given of the controlling and synchronizing devices. "Exact" operations (expansion of the chamber, separation of single pulses, illumination, etc.) are controlled by the circuit shown in Fig.4 and the "rough" operations are controlled by the circuit of Fig.5. The absolute beam intensity was obtained by measuring the β activity of a graphite specimen placed in the γ -beam. The chamber was used to study photodisintegration of He at a maximum energy of 170 MeV. A typical photograph of the $\text{He}^4(\gamma p)\text{H}^2$ reaction is shown in Fig.7. Thanks are given to P.A.Cherenkov for help and interest. There are 7 figures, no tables and 5 references, of which 3 are Russian and 2 are English.

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120-5-2/40

A Wilson Chamber for Work in the Beam of Cyclotron Radiation and the Auxiliary Apparatus.

ASSOCIATION: Institute of Physics imeni P.N. Lebedev AS USSR
(Fizicheskiy institut im. P.N.Lebedeva AN SSSR).

SUBMITTED: November 3, 1956.

AVAILABLE: Library of Congress.

Card 3/3 1. Cloud chambers-Operation

GORBUNOV, A.N.

AUTHOR GORBUNOV, A.N., SPIRIDONOV, V.M. 56-7-4/66
 TITLE Photodisintegration of Helium.I.
 (Fotorasshchepleniye Geliya.I. - Russian)
 PERIODICAL Zhurnal Eksperim. i Teoret.Fiziki, 1957, Vol 33, Nr 7, pp 21-32 (U.S.S.R.)
 ABSTRACT By means of a Wilson chamber which was located in a magnetic field the various (He- γ)-reactions were investigated. A 170 MeV bremsstrahl bundle served as γ - source. The following results were obtained:
 1) The reaction $\text{He}^4(\gamma, p)\text{H}^3$ was observed in 2835 cases, the reaction $\text{He}^4(\gamma, n)\text{He}^3$ in 2685, the reactions $\text{He}^4(\gamma, p)d + \text{He}^4$ in 547, and the reaction $\text{He}^4(\gamma, 2d)$ in ≤ 59 cases.
 2) The course of the cross section of the reaction $\text{He}^4(\gamma, p)\text{H}^3$ has a marked broad maximum at $E_\gamma = 27\text{-}28$ MeV (place of resonance) with $\sigma \sim 1,8 \text{ mb}$. The decrease according to higher γ -energies can be described by $E_\gamma / (E_\gamma - \epsilon)^{2,5}$.
 3) The integral cross sections of the reaction $\text{He}^4(\gamma, p)\text{H}^3$ are:

Energy limits in MeV	Integral Cross section in MeV.
19,8 - 40	25,0 \pm 1,8
19,8 - 100	35,8 \pm 2,6
19,8 - 170	37,8 \pm 2,8

 4) The integral cross section of the reaction $\text{He}^4(\gamma, pn)d$ is 10.0 \pm 1,4 MeV .
 5) For the reaction $\text{He}^4(\gamma, p)\text{H}^3$ the angular distribution of the protons was measured. The following coefficient values were determined

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Photodisintegration of Helium.I.

56-7-4/66

for the distribution

$$A [\sin^2 \theta + B \sin^2 \theta \cos \theta + C \sin^2 \theta \cos^2 \theta]$$

E in MeV

A

B

21-30

7,6±0,7

0,11±0,13

-0,2±0,3

30-170

6,1± 0,6

1.05±0,16

0,53±0,25

(4 tables, 7 illustrations, 10 Slavic references)

ASSOCIATION Physical Institute "P.N. Lebedev" of the Academy of Sciences of the USSR
(Fizicheskii institut im. P.N. Lebedeva Akademii nauk SSSR)

SUBMITTED 11.2.1957

AVAILABLE Library of Congress.

Card 2/2

GORBUNOV, A. N. and SPIRIDONOV, V. M. (Moscow USSR)

"Photodesintegration de l'hélium."

report presented at the Intl. Congress for Nuclear Interactions (Low Energy) and Nuclear Structure (Intl. Union Pure and Applied Physics) Paris, 7-12 July 1958.

GORBUNOV, A.N., Cand Phys Math Sci -- (diss) "Photo^osplitting
of helium." Mos, 1958, 8 pp (Acad Sci USSR. Phys Inst im
P.N. Lebedev) 150 copies. Bibliography at end of text
14
(~~14~~ titles) (KL, 29-58, 128)

- 5 -

AUTHORS: Gorbunov, A. N., Spiridonov, V. M. 56-34-4-12/60

TITLE: Photodesintegration of Helium.II (Fotorasshchepleniye geliya.II)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 4, pp. 862 - 865 (USSR)

ABSTRACT: This work investigates the results of the investigation of the reaction $\text{He}^4(\gamma, n)\text{He}^3$, which in the evaluation of the same series of results were obtained. First the evaluation of the results is discussed. In the reaction $\text{He}^4(\gamma, n)\text{He}^3$ a charged particle is emitted, namely the recoil nucleus He^3 which in the Wilson cloud chamber yields a very thick trace. From the emission angle and from the momentum of the He^3 nucleus the energy of the photon causing the reaction can be ascertained. For the measurement of the spatial emission angles and of the momenta the traces of the He^3 nuclei with sufficiently long projection to the plane of the chamber bottom were chosen and the momenta were determined from the curvature of the traces in a magnetic field. The procedure of the measurement of the angles and of the momenta and the necessary corrections were described already in the first part of this series of works. Of the total number of 2685 registered cases of the reaction $\text{He}^4(\gamma, n)\text{He}^3$ 722 traces of

Card 1/3

Photodesintegration of Helium.II

56-34-4-12/60

the He^3 nuclei were worked. All measured traces of the He^3 nuclei were transferred to a nomogram which served as initial base of the further computation of the energy dependence and of the angular distribution. Results: The dependence of the cross section of the reaction $\text{He}^4(\gamma, n)\text{He}^3$ on the energy of the photons is illustrated by a diagram. This reaction has resonance character with the maximum $\sim 1,6 \cdot 10^{-27} \text{ cm}^2$ at an energy of 27 to 28 MeV. The position of the maximum and the magnitude of the cross section agree within the error limits with the corresponding values for the reaction (γ, p) . The curves of the cross sections of the reactions (γ, p) and (γ, n) agree in their form but the curve of the reaction (γ, n) runs a bit higher at photon energies of above 35 MeV. A further diagram illustrates the angular distribution of the neutrons which form in the reaction $\text{He}^4(\gamma, n)\text{He}^3$ in the center of mass system. These angular distributions are approximated by curves of the kind $A(\sin^2\theta + \beta \sin^2\theta \cos\theta + \delta)$. The values of the coefficients A, β, δ ascertained by the method of the least squares are composed in a table. The angular distribution of the neutrons remains equal in the transition from photon energies of below 30 MeV to energies of above 30 MeV within the measuring fault limits

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Photodesintegration of Helium. II

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and resembles a distribution of the form $\sin^2\theta$ in the center of mass system. These particularities of the angular distributions of the protons and neutrons can be explained on the basis of the model of the direct absorption of the photon by a single nucleon (E.D.Courant, reference 7). The authors thank Professor P. A. Cherenkov for his constant interest in this work; Yu. K. Khokhlov, V. V. Daragan and Yu. M. Shirokov for the judgement of the obtained results; A.G.Gerasimov, V.S.Silayev, N.N.Novikov, K. V. Chekhovich and Khu Zhen'-Yuy, which took part in the evaluation of the results and also the crew of the synchrotron. There are 3 figures, 2 tables, and 9 references, 3 of which are Soviet.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR
(Institute of Physics imeni P. N. Lebedev, AS USSR)

SUBMITTED: December 14, 1957

1. Helium--Decay 2. Neutrons--Scattering

Card 3/3

AUTHORS: Gorbunov, A. N., Spiridonov, V. M. 56-34-4-13/60

TITLE: Photodesintegration of Helium. III (Fotorasshchepleniye geliya III)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 4, pp. 866 - 873 (USSR)

ABSTRACT: This work investigates the reaction $\text{He}^4(\gamma, \text{pn})\text{D}$ and gives a compilation of the results of the investigation of He^4 photodesintegration. The investigation of this reaction is of interest in connection with the verification of the model suggested by Yu. K. Khokhlov (Reference 3) and J. S. Levinger (Reference 4), of the absorption of photons rich in energy by nuclei. First the authors describe the evaluation of the results. A diagram illustrates the curve of the cross section of the reaction $\text{He}^4(\gamma, \text{pn})\text{D}$ in dependence on the energy of the photons. This reaction has a resonance-like character with a maximum at an energy of about 50 MeV. The cross section in this maximum is about $2 \cdot 10^{-28} \text{ cm}^2$. In the case of a photon energy of the order of 75 MeV the cross sections of the reactions (γ, pn) , (γ, p) and (γ, n) are about equal to each other. A table gives the inte.

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. Photodesintegration of Helium. III

56-34-4-13/60

gral cross sections of the reaction (γ, pn) . At energies below 75 MeV the contribution of the reaction (γ, pn) to the integral cross section of the absorption of photons is less than 10%, while in the energy range above 75 MeV it increases to more than 30%. 3 further diagrams illustrate the angular distribution of the protons, neutrons, and deuterons in the center of mass system for the ranges of the photon energy 25,9 MeV (threshold value) to 75 MeV and from 75 to 170 MeV. The angular distributions of the protons and neutrons which form in the reaction (γ, pn) resemble very much the angular distributions of the protons and neutrons which occur in the photodesintegration of a deuteron. The angular distribution of the deuterons in both above mentioned intervals of the photon energy is almost isotropic. Then the authors report on the correlation between the particles. At the photon energies above 75 MeV the neutron and the proton predominantly were emitted almost into opposite directions. The quasi-deuteron adsorption of the photons at low energies and also at energies above 75 MeV seems to be responsible for the reaction $\text{He}^4(\gamma, pn)\text{D}$. The reactions $\text{He}^4(\gamma, p)\text{H}^3$ and $\text{He}^4(\gamma, n)\text{He}^3$ are caused by a direct single-particle absorption of the photon, where the electric dipole absorption plays

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Photodesintegration of Helium. III

56-34-4-13/60

the main role. At the energies above 30 MeV the influence of the electric quadrupole absorption begins. The relative influence of the single-particle and of the two-particle absorption depends on the energy. At energies above 75 MeV the contribution of the two-particle absorption to the integral cross section of the absorption is at least 30%. For the integral cross section of the absorption of photons the value $\sigma_{\text{int}} = 95 \pm 7$ MeV. millibar and for the mean square radius of the nucleus He^4 the value $R = (1,57 \pm 0,06) \cdot 10^{-13}$ cm is obtained. The authors thank Professor P.A.Cherenkov for his constant attentiveness for this work. A.M.Baldin, V.V.Daragan, Yu.M.Shirokov and Yu.K. Khokhlov for the discussion of the results obtained, S.I. Shornikov, A. G. Gerasimov, A. N. Novikova, V.A. Osipova, V. S. Silayeva and K. V. Chekhovich for their participation in the evaluation of the takings, and the crew for operating the synchrotron. There are 8 figures, 2 tables, and 25 references, 4 of which are Soviet.

Card 3/4

. Photodesintegration of Helium. III

56-34-4-13/60

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR
(Institute of Physics imeni P. N. Lebedev AS USSR)

SUBMITTED: December 14, 1957

1. Helium---Decay 2. Neutrons---Scattering

Card 4/4

PHASE I BOOK EXPLOITATION

SOV/4098
SOV/5-S-13

Akademiya nauk SSSR. Fizicheskiy institut

Teoriya uskoriteley. Fotoyadernyye reaktsii (Theory of Accelerators.
Photomuclear Reactions) Moscow, 1960. 225 p. (Series: Its: Trudy, tom 13)
Errata slip inserted. 2,500 copies printed.

Resp. Ed.: D.V. Skobel'tsyn, Academician; Tech. Ed.: Yu. V. Rylina.

PURPOSE: This collection of articles is intended for nuclear physicists interested
in the theory of accelerators and photomuclear reactions.

COVERAGE: This collection of three articles, published by the FIAN (Physics
Institute, Academy of Sciences USSR) contains the work of A.A. Kolomenskiy,
Ye. M. Moroz, and A.N. Gorbunov. Kolomenskiy is concerned with an investigation
of the theory of particle movement in modern cyclic accelerators. The article
by Moroz deals with a theoretical investigation of methods for increasing the
efficiency of cyclic accelerators. The third article, by Gorbunov, discusses
photodisintegration of helium. Bibliographies of Soviet and non-Soviet sources
appear at the end of each article. The following personalities are mentioned:

Carl 1/5

Theory of Accelerators. Photonuclear Reactions

SOV/4098

A.N. Lebedev, L.L. Sabsovich, Academician V.I. Veksler, Director of FIAN;
M.S. Rabinovich, P.A. Cherenkov, A.M. Baldin, Yu. M. Shirokov, Yu. K. Khokhlov,
Aspirant V.V. Daragan, V.M. Spiridonov (deceased), A.G. Gerasimov, Yu. S. Ivanov,
A.V. Kutsenko, V.A. Dubrovina, N.N. Novikova, A.I. Orlova, V.A. Osipova,
Y.S. Silayeva, K.V. Chekhovich and S.I. Shornikov.

TABLE OF CONTENTS:

Kolomenskiy, A.A. Investigation of the Theory of Particle
Movement in Modern Cyclic Accelerators

The author discusses the following basic problems: linear and
non-linear theory of betatron particle oscillations in magnetic
periodic systems; critical energy in high-focusing synchrotrons;
the effect of radiation upon motion of electrons in cyclic accel-
erators; theory of the ring cyclotron.

3

Moroz, Ye. M. Theoretical Investigation of Methods of Increasing
the Efficiency of Cyclic Accelerators

The author discusses antophasing of accelerated particles; damping
of synchrotron oscillations; effect of quantum fluctuations in radiation
of electrons on synchrotron oscillations; the ideal cyclotron; the
isochronous cyclotron; sector cyclotrons; and focusing of particles in
sector cyclotron and cyclotrons with stable adjacent orbits.

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Theory of Accelerators. Photomuclear Reactions

80V/4098

Gortunov, A.N. Photodisintegration of Helium

174

The author analyzes experimental methods, using the Wilson chamber in the synchrotron beam; discusses processing the results by examination of photographs, identification of nuclear disintegrations, measurement of the angle of recoil of particles, measurement of particle impulse, etc.; presents results of measurements and finally analyzes results.

AVAILABLE: Library of Congress

Card 3/3

JA/wrc/mas
9-30-60

GORBUNOV, A.N.; SPIRIDONOV, V.M. [deceased]; CHERENKOV, P.A.

Comments on the existence of particles with masses of $2m_e$
 $25m_e$. Zhur. eksp. i teor. fiz. 38 no.1:69-73 Jan '60.

(MIRA 14:9)

1. Fizicheskiy institut im. P.N.Lebedeva Akademii nauk SSSR.
(Particles (Nuclear physics))

83716

S/056/60/038/004/009/048
B019/B070

24.6600

AUTHORS: Gorbunov, A. N., Denisov, F. P., Kolotukhin, V. A.

TITLE: Reactions $^{27}\text{Al} \rightarrow ^{24}\text{Na}$, $^{59}\text{Co} \rightarrow ^{56}\text{Mn}$, $^{31}\text{P} \rightarrow ^{24}\text{Na}$ in the
 γ -Quantum Energy Range up to 260 Mev

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,
Vol. 38, No. 4, pp. 1084-1087

TEXT: The three photonuclear reactions mentioned in the title were studied with a view to obtaining information on the interaction of photons in the energy range 30-260 Mev with nuclei. The experiments were carried out with the 260 Mev synchrotron at the Institute mentioned under association. The maximum energy of the synchrotron could be determined with an accuracy of $\pm 2\%$. The targets were prepared from high-purity materials. The activity of the samples was measured with three equal 4π assemblies of β counters. During the experiment, the measuring apparatus was checked by radium standards. Fig. 1 shows the dependence of the yield from the three reactions investigated on the energies of the photons. Their differential cross section was calculated from this. X

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83716

Reactions $\text{Al}^{27} \rightarrow \text{Na}^{24}$, $\text{Co}^{59} \rightarrow \text{Mn}^{56}$, $\text{P}^{31} \rightarrow \text{Na}^{24}$ S/056/60/038/004/009/048
in the γ -Quantum Energy Range up to 260 Mev B019/B070

The results are shown diagrammatically in Figs. 2-4. From the discussion of the results obtained here, the conclusion is drawn that for photon energies above 60-80 Mev the interaction of the photons with the nuclei takes place without the formation of a compound nucleus. The authors thank Professor P. A. Cherenkov for his interest in the work. They also thank the staff of the synohrotron. There are 4 figures and 7 references: 2 Soviet, 4 US, and 1 Canadian.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR
(Institute of Physics imeni P. N. Lebedev of the Academy of
Sciences, USSR) X

SUBMITTED: November 4, 1959

Card 2/2

33095

S/638/61/001/000/018/056

B104/B138

24.6700

AUTHORS:

Gerasimov, A. G., Gorbunov, A. N., Dubrovina, V. A., Kaipov, D., Kuvatov, K., Orlova, A. I., Osipova, V. A., Sakovich, V. A., Silayeva, V. S., Fomin, Yu. A., Cherenkov, P. A.

TITLE:

Study of photodisintegration of nitrogen, oxygen, and neon

SOURCE:

Tashkentskaya konferentsiya po mirnomy ispol'zovaniyu atomnoy energii. Tashkent, 1959. Trudy. v. 1. Tashkent, 1961, 134 - 153

TEXT: The photodisintegration of N_7^{14} , O_8^{16} , and N_{10}^{20} was studied by means of a Wilson chamber in a magnetic field acting directly on the bremsstrahlung beam. In order to be able to distinguish reactions γp are γpn , and record the recoil nuclei, the Wilson chamber was filled with a mixture consisting of the gas to be investigated (nitrogen or neon) and hydrogen. Reduced pressure was used in experiments with oxygen. In experiments with nitrogen, oxygen, and neon, the stopping power for protons was 0.65, 0.31, and 0.50 relative to air. The mean energy of the photo-
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X

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S/638/61/001/000/018/056

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Study of photodisintegration ...

protons from γ pn reactions was lower than that from γ p reactions. The effective cross sections were calculated; their shape indicates the importance of transitions in the residual nuclei. The proton angular distribution from γ pn reactions is nearly isotropic for low proton energies. For high proton energies (>20 Mev), it is very similar to that in deuterium photodisintegration. The proton angular distribution from γ p reactions is approximately isotropic for N_7^{14} and O_8^{16} at low energies. In the expression $d\sigma/d\Omega \sim A(1+B/\text{Asin}^2\theta+C/\text{Asin}^2\theta\cos\theta+D/\text{Acos}\theta)$, the effect of the last three terms in parentheses increases for higher energies. The isotropic part of the angular distribution is greater for N_{10}^{20} than for the two other isotopes. An abnormally high yield of the γ pn reaction was found for N_7^{14} ; it is attributed to interaction of a photon with a pair of "valency" nucleons in the outer shell, which are in the $1p_{1/2}$ state with parallel spins. During photon absorption, the electric dipole absorption plays an essential part in N and O nuclei. The logarithmic moments of the photon-absorption cross sections are in good agreement with results obtained on the basis of an independent-particle model. Yu. K. Khokhlov

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Study of photodisintegration ...

S/638/61/001/000/018/056
B104/B138

(DAN, SSSR, 1954, 97, 239; ZhETF, 1957, 32, 124) and A. B. Migdal (ZhETF, 1945, 15, 81) are mentioned. There are 9 figures, 7 tables, and 22 references: 8 Soviet and 14 non-Soviet. The four most recent references to English-language publications read as follows: Livesey D. L. Canad. Journ. Phys., 35, 9, 1957; Rhodes, Stephens W. E. Phys. Rev., 110, 1415, 1958; Elliot, Flowers B. H. Proc. Roy. Soc., A. 242, 57, 1957; Svantesson N. L. Nucl. Phys., 3, 273, 1957.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Physics Institute imeni P. N. Lebedev AS USSR)

Card 3/4
-3

X

S/707/62/005/000/011/014
D290/D308

AUTHORS: Gorbunov, A.N., Kaipov, D.K. and Kuvatov, K.G.
TITLE: Photodisintegration of neon nuclei
SOURCE: Akademiya nauk Kazakhskoy SSR. Institut yadernoy fiziki. Trudy, v. 5. Alma-Ata, 1962. Fizika chastits vysokikh energiy. Struktura yadra, 135-146

TEXT: The authors studied the photodisintegration of neon nuclei for photon energies up to 70 Mev; they used a cloud-chamber that contained neon and that was placed in a magnetic field of 10,510 gauss. They measured the relation between the effective cross-section of the (γ P) reaction and the photon energy E_p ; the maximum cross-section (11.48 ± 0.81 mbarn) occurs for $E_p = 18-20$ Mev, which indicates that the ^{19}F nucleus is formed in an excited state. The yields and cross-sections of various types of reaction were measured; the integral absorption cross-section is 0.588 ± 0.0085 barn-Mev. The value of σ_b ($\sigma_b = \frac{\sigma(E)}{E} dE$) is 17.58 ± 0.25 mbarn; this

Card 1/2

Photodisintegration of neon nuclei

S/707/62/005/000/011/014
D290/D308

agrees well with the value calculated for electric dipole absorption using the independent particle model of the nucleus. The root-mean-square radius of charge distribution R_c for the neon nucleus ($R_c = 2.529 \times 10^{-13}$ cm) and the nuclear unit radius r_0 ($r_0 = 1.183 \times 10^{-13}$ cm) were calculated from σ_b . The polarizability of nuclear matter σ_{-2} was calculated ($\sigma_{-2} = 0.619$ mbarn/Mev); this value agrees well with the theoretical value found using the collective model of the nucleus. The proton angular distributions were measured for the (γp) , (γpn) , and $(\gamma p\alpha)$ reactions; the results confirm the direct dipole absorption of γ -quanta by separate nucleons. The proton angular distribution for the (γpn) reaction is isotropic for $E_p < 5$ Mev, but strongly favors the forward direction for $E_p > 5$ Mev; this may indicate that quasi-deuteron absorption occurs at high energies. The most important English-language reference reads as follows: Levinger, J.S., Bethe, H.A., Phys. Rev., 78, 115, 1950. There are 8 figures and 3 tables.

Card 2/2

SUSAREV, M.P.; GORBUNOV, A.N.

Isotherm-isobar equation of vapor and the evaluation of the reliability
of data on liquid-vapor equilibrium in three-component systems. Zhur.
prikl.khim. 35 no.1:111-115 Ja '62. (MIRA 15:1)
(Systems (Chemistry)) (Phase rule and equilibrium)

S/056/62/043/001/007/056
B125/B102

AUTHORS: Gorbunov, A. N., Osipova, V. A.

TITLE: Photodisintegration of oxygen. I

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43,
no. 1(7), 1962, 40-50

TEXT: The cross sections and angular distributions for the (γ, p) and (γ, n) reactions on oxygen were determined from 732 proton tracks and 1,256 tracks of O^{15} recoil nuclei, respectively. The tracks were recorded with a Wilson chamber in a magnetic field of ~ 10.5 kee. The cross section for the (γ, p) reaction increases from zero at $h\nu = 12$ Mev to the first peak (~ 8 mb) at $h\nu \sim 17$ Mev, followed by two peaks of ~ 7 mb at $h\nu \sim 21$ Mev and ~ 23 Mev. The cross section then decreases according to an approximately exponential law to zero at $h\nu \sim 75$ Mev. The (γ, n) cross section which follows a similar course has its main peak of ~ 9 mb at $h\nu \sim 22$ Mev, and a second peak of ~ 6 mb at $h\nu \sim 25$ Mev. In the direct photoeffect model with purely electric dipole absorption the nucleon angular distribution is approximated by the expression $f(\theta) = A + B \sin^2 \theta$. V

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S/056/62/042/003/017/049
B102/B138

AUTHORS: Corbunov, A. N., Dubrovina, V. A., Osipova, V. A., Silayeva, V. S., Cherenkov, P. A.

TITLE: Investigation of the photoeffect on light nuclei

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 3, 1962, 747 - 757

TEXT: A cloud chamber with a field of $10.5 \cdot 10^3$ oe was used to measure the yields from photonuclear reactions with nitrogen, oxygen and neon and the cross sections $\sigma_0 = \int \sigma(E) dE$, $\sigma_{-1} = \int \sigma(E) E^{-1} dE$, and $\sigma_{-2} = \int \sigma(E) E^{-2} dE$, where $\sigma(E)$ is the total photon absorption cross section. The maximum bremsstrahlung used was $E_{\gamma \text{ max}} = 170$ Mev. Besides the photonuclear reactions given in Table 1, some 3 - 6 pronged stars were observed but not identified. The following results were obtained from 5300 (N), 8500 (O) and 8500 frames (Ne) taken in these experiments: The ratios of the yields of the (γ, pn) and (γ, p) reactions on the " α -nuclei" O^{16} and Ne^{20} are almost equal and amount to $\sim 20\%$. For a free α -particle this value equals \checkmark

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Investigation of the ...

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17%. For N^{14} this ratio is many times higher, being 1.90 ± 0.07 . This indicates that (γ, pn) is the main reaction for N^{14} , though its threshold is higher than that of (γ, p) and (γ, n) . This fact is attributed to the low thresholds of emission of the valent nucleons from N^{13} and C^{13} . The yield of $(\gamma, pn, 3\alpha)$ reaction on N exceeds those for O and Ne by a factor of 3.5. It is attributed to the decay of a highly excited C^{12} nucleus due to a (γ, pn) reaction. The yield of three-pronged Ne stars is also high due mainly to $(\gamma, p\alpha)$ reactions. Apparently the $N^{20}(\gamma, p\alpha)N^{15}$ reaction is the result of an α -emission of excited F^{19} produced in a (γ, p) reaction. The (γ, α) reactions were small for all nuclei. The cross sections have been measured separately for all reaction types. When these separate values are summed up, the following is obtained for N^{14} , O^{16} and Ne respectively: $\sum \sigma_0$: 347, 438, 600 Mev.mb; $\sum \sigma_{-1}$: 12.5, 12.8, 18.0 mb; $\sum \sigma_{-2}$: 0.46, 0.43, 0.60 mb/Mev. The theoretical values obtained with $\sigma_0 = 60(NZ/A)$, Mev.mb $\sigma_{-1} = 0.36A^{4/3}$ mb, and $\sigma_{-2} = 2.25A^{5/3}$ mb/Mev are, Card 2/4

Investigation of the ...

S/056/62/042/003/017/049
B102/B138

except for σ_{-1} , lower. The experimental values can be explained by the summation rule. The integral cross sections agree with calculations for electrical dipole absorption when exchange forces are taken into account. The small difference between the (γ, p) and (γ, n) reactions and the very small one between the (γ, α) reactions of the nuclei agree with the conception of the charge independence of nuclear forces. A. G. Gerasimov, A. I. Orlova, N. Pluzhnikova, V. A. Sakovich, Yu. A. Fomin, and V. Ye. Yakushkin are thanked for assistance. There are 3 figures, 5 tables, and 36 references: 11 Soviet and 25 non-Soviet. The four most recent references to English-language publications read as follows: D. Balfour, D. C. Menzies. Proc. Phys. Soc. 75, 543, 1960; J. S. Levinger. Nuclear Photo-disintegration, Oxford, University press, 1960. G. Brown, M. Bolsterli. Phys. Rev. Lett 3, 472, 1959; K. Okamoto. Phys. Rev. 116, 428. 1959.

SUBMITTED: October 28, 1961

Card 3/4

SUSAREV, M.P.; GORBUNOV, A.N.

Liquid - vapor equilibrium in the system benzyl alcohol - toluene - water.
Zhur.prikl.khim. 36 no.2:459-461 F '63. (MIRA 16:3)
(Benzyl alcohol) (Toluene) (Phase rule and equilibrium)

GORBUNOV, A.N.; SUSAREV, M.P.

Liquid - vapor equilibrium in the system benzoic acid -
methanol - water. Zhur. prikl. khim. 36 no.9:2021-2024
D '63. (MIRA 17:1)

SUSAREV, M.P.; GORBUNOV, A.N.

Differential equations for families of solubility isotherms of the solid phases of the ternary system at equilibrium with an ideal melt. Zhur. prikl. khim. 37 no.2:304-310 F '64.

(MIRA 17:9)

SUSAREV, M.P.; GORBUNOV, A.N. (Leningrad)

Calculation of liquid - vapor isothermal equilibrium in ternary systems of which two components form a system with small deviations from the laws of ideal solutions. Zhur. fiz. khim. 38 no.3:583-588 Mr '64. (MIRA 17:7)

1. Leningradskiy gosudarstvennyy universitet imeni A.A. Zhdanova.

ACCESSION NR: AP4031185

S/0056/64/046/004/1492/1494

AUTHOR: Taran, G. G.; Gorbunov, A. N.

TITLE: Investigation of reaction (γ , p) on carbon

SOURCE: Zh. eksper. i teor. fiz., v. 46, no. 4, 1964, 1492-1494

TOPIC TAGS: photodisintegration, carbon photodisintegration, dipole level, integral cross section, sum rule, exchange force

ABSTRACT: In order to observe the theoretically predicted intense dipole level of carbon above 30 MeV, an investigation was made of the photodisintegration of carbon at energies above 30 MeV. This was done by investigating the (γ , p) reaction on carbon with a cloud chamber in a magnetic field, placed in a bremsstrahlung beam with maximum energy 170 MeV. A total of 5207 reactions in carbon was found in 18,000 pictures. The plot of the cross section of (γ , p) reaction calculated from these data indicates that the maxima observed

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ACCESSION NR: AP4031185

in the cross section are connected with the excitation of two different levels of C^{12} . The position of these levels and their total integral cross section are in good agreement with the position of the expected intense dipole level and with its integral cross section, which amounts to 15--20% of the dipole sum. The total integral cross section of the (γ, p) reaction from threshold to 170 MeV is 122 ± 5 MeV-mb, and the integral cross section up to 37 MeV is 102 MeV-mb, or 85% of the total integral cross section. The total integral cross section of the reactions (γ, p) , (γ, n) , and (γ, pn) from threshold to 37 MeV accounts for almost the entire cross section given by the sum rule without allowance for the exchange forces. Orig. art. has: 1 figure and 1 table.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Sciences SSSR)

SUBMITTED: 30Oct63

DATE ACQ: 07May64

ENCL: 01

SUB CODE: NP

NR REF SOV: 001

OTHER: 005

Card 2/3

ACCESSION NR: AP4031185

ENCLOSURE: 01

Yields of different reactions on carbon

Тип реакции 1	Число наблю- даемых случа- ев 2	Выход по отноше- нию к пол- ному вы- ходу, % 3	Тип реакции	Число наблю- даемых случа- ев 5	Выход по отноше- нию к пол- ному вы- ходу, % 6
(γ , p)	2207	42	(γ , 3 α)	137	2,5
(γ , n)	1541	31	(γ , 2 α 'n)		
(γ , pn)	408	8	[C ¹² (γ , nHe ³)2He ⁴]	42	0,8
(γ , α ')[C ¹² (γ , He ³)Be ⁹]	83	1,5	звезды 4-лучевые	301	5,5
(γ , α n)	92	1,8	в том числе		
4 - звезды 3-лучевые	542	10	(γ , 3pn)	32	0,6
8 в том числе			(γ , 2p2 α)	99	1,8
(γ , p α)	229	4,5	(γ , 2 α p)	141	2,7
(γ , p α n)	52	1	звезды 5-лучевые	28	0,5
(γ , 2p)	51	1	звезды 6-лучевые	5	0,1
(γ , 2pn)	31	0,6			

1 - type of reaction, 2 - number of observed events,
3 - percentage of total yield, 4 - three-prong stars,
5 - four-prong stars, 6 - five-prong stars, 7 - six-
prong stars, 8 - including

Card 3/3

VARFOLOMEYEV, A.T.; CORBUNOV, A.N.

Photodisintegration of He^3 . Zhur. eksp. i teor. fiz. 47
no.1:30-39 J1 '64. (MIRA 17:9)

1. Fizicheskiy institut ineni Lebedeva AN SSSR.

GORBUNOV, A. N.

USSR / Human and Animal Physiology, Physiology of Work T
and Sport.

Abstr Jour: Ref Zhur-Biol., No 22, 1958, 102346.

Author .: Khanina, K. P.; Gorbunov, A. N.; Kutsenko, Ya. G.

Inst : Kiev Institute of Physical Culture.

Title : The Dynamics of the Changes of Body Composition
of Heavy Athletes During the Period of Preparation
for Competitions.

Orig Pub: Tr. Kiyevsk. in-ta fiz. kul'tury, 1957, vyp. 2,
89-93.

Abstract: No abstract.

Card 1/1

GORBUNOV, A.P.

Some results of reconnaissance work on the study of permafrost
in the Arabel'su mountain pasture in inner Tien Shan. Trudy
Otd.geog.i Tian.fiz.-geog.sta.AN Kir.SSR no.1:109-116 '58.
(MIRA 12:2)

(Arabel'su Valley--Frozen ground)

GOMU OV, A. P. --

"Sketches on the History of Physico-geographical Investigations of Kazakhstan (17th, 18th, and 19th Centuries)." Cand Geog Sci, Inst of Geography, Acad Sci USSR, 22 Oct 54. (VI, 13 Oct 54)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (10)

SC: Ser. No. 461, 5 May 55

GORBUNOV, A.P., kand.geograficheskikh nauk (Alma-Ata)

Hollow hill. Priroda 49 no.7:111 J1 '60.

(MIRA 13:7)

(Tien Shan--Physical geography)

GORBUNOV, A.P.

Somepermafrost phenomena in the syrts of the inner Tien Shan.
Mat. gliats. issl. no.2:77-89 '60. (MIRA 14:11)
(Tien Shan--Frozen ground)

GORBUNOV, A.P.

Moor-meadow cryogenic complex in the Tuyuk-Chakyr-Korum Valley.
Rab. Tian'-Shan'. vysokogor. fiz.-geog. sta. no.6:77-84 '64.
(MIRA 17:12)